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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/775,749	02/10/2004	Kyle G. Peltonen	14917.1191US01/MS300571.0	8729

27488   7590   05/26/2009
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EXAMINER
PHAM, HUNG Q

ART UNIT	PAPER NUMBER
2159	

MAIL DATE	DELIVERY MODE
05/26/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)	
Office Action Summary	10/775,749	PELTONEN ET AL.	
	Examiner	Art Unit	
	HUNG Q. PHAM	2159	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>12 March 2009</u>.

2a) ☐ This action is **FINAL.**   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>1-3,5,7-14,18-21,23-27 and 29-31</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) <u>1-3,5,7-14,18-21,23-27 and 29-31</u> is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some *   c) ☐ None of:

       1. ☐ Certified copies of the priority documents have been received.

       2. ☐ Certified copies of the priority documents have been received in Application No. _____.

       3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 03/12/2009 has been entered.

Response to Arguments

<u>Claim Rejections - 35 USC § 102(e) and 103(a)</u>

- Applicant's arguments with respect to the rejection of claim 1 under 35 U.S.C. § 102 have been fully considered but they are not persuasive.

As argued by applicant (Remarks, Page 8):

> The cited references teach directly away from the above combination of features. As indicated in claim 1, claim 1 recites an inverted keyword index and a separate inverted keyword attribute index. It is clear that claim 1 is reciting two separate indexes. Each index includes separate information to cause different functionality. They are separately stored in the shared process memory and each is used to process the keyword query. With regard to Stephan, Stephan is teaching a single expanded inverted index. The inverted index itself is expanded to include further information. Stephan is not teaching the two separate indexes as indicated in independent claim 1. Stephan actually teaches directly away from two separate indexes as indicated. Stephan teaches that "[a]n expanded inverted list for an index term can be structured to improve phrase query searching without using an auxiliary index." (Stephan, col. 4, lines 21-23). Throughout Stephan, Stephan is teaching a single index. Accordingly, applicants respectfully request reconsideration and allowance of independent claim 1.

The examiner respectfully disagrees.

Stephan teaches that an expanded inverted list is structured without using an auxiliary index at Col. 4-Lines 21-23. However, the auxiliary index is the next word auxiliary index, which

is described by Bahle et al. (Stephan, Col. 1-Lines 54-60). The next word auxiliary index as

taught by Bahle is not the expanded inverted index as taught by Stephan. Therefore, the

expanded inverted index as taught by Stephan can not be considered as being not used in

Stephan teaching.

   As taught by Stephan, information about the proximity of common terms to an infrequent

term can included in an expanded inverted list (Stephan, Col. 4-Lines 34-36), wherein an integer

value is assigned to each common term for identifying the common term in the expanded

inverted list (Stephan. Col. 4-Lines 41-44). A posting in an expanded inverted list, for example,

can be in the form $\{d, k, f_{d,t} [C_1, O_1, ... C_{fd,t}, O_{fd,t}]\}$ (Stephan, Col. 4-Lines 52-62). For each index

term included in the vocabulary of terms, an inverted list is generated. An expanded inverted

index for the collection of documents would include the indexed terms in the vocabulary of terms

and corresponding inverted lists (Stephan, Col. 5-Lines 30-58). As further disclosed by Stephan,

a compressed expanded inverted index requires less storage space and then can transferred

more quickly form disk to memory. Additionally, because compressed expanded inverted lists

require less storage space, more expanded inverted lists can be cached at one time (Stephan,

Col. 6-Lines 35-42). The Stephan's teaching clearly indicates expanded inverted index and the

set of inverted list are separated at least in view of their processes and storage.

   •   Applicant's arguments with respect to the rejection of claim 23 under 35 U.S.C. §

102 have been fully considered but they are not persuasive. Claim 23 is unpatentable over

Stephan for at least the reasons as discussed above with respect to claim 1.

   •   Applicant's arguments with respect to the rejection of claim 11 under 35 U.S.C. §

102 have been fully considered but they are not persuasive. Claim 11 was amended by

including newly added features, which were not supported by the specification. Therefore, claim

11 is rejected under 35 U.S.C. § 112, 1st paragraph.

As disclosed in the specification, *once the keyword token information is obtained, at block 406, the data parsing/index generation component generates an inverted keyword index and inverted keyword attribute index. The generation of the inverted keyword index and an inverted keyword attribute index will be described below with regard to FIGURES 5 and 6. At block 408 the data parsing/index generation component 126 stores the inverted keyword index and an inverted keyword attribute index in the shared memory buffer 114* (Specification, Page 7, Line 28→Page 8, Line 3). With reference to FIG. 5, *the data parsing/index generation component 126 obtains the first keyword token from the set of data 132* (Specification, Page 8, Lines 14-15), *inserts the keyword token data as a node in a red and black index tree* (Specification, Page 8, Lines 22-23) and *inserts keyword token attribute data into a temporary inverted keyword attributed index* (Specification, Page 10, Lines 8-9), wherein *the shared memory buffer 114 including an inverted keyword index 118 and a temporary inverted keyword attribute index* 120 (Specification, Page 10, Lines 12-13). As further disclosed in the Specification, *the data parsing/index generation component 126 converts the temporary inverted keyword attribute index into an optimized attribute list* (Specification, Page 11, Lines 6-8).

The specification does not have the description of newly added *inverted keyword red and black tree index* and *an inverted keyword attribute red and black tree index* in claim 11. Neither the specification specifies how to generate *inverted keyword red and black tree index* and *an inverted keyword attribute red and black tree index* nor the step of *inserting the keyword into the read and black index of the inverted keyword red and black tree index, converting the temporary keyword attribute index into the inverted keyword attribute red and black tree index in the shared process memory buffer* and *storing the inverted keyword read and black tree index and the inverted keyword attribute red and black tree index in a shared process memory buffer.*

For the purpose of examination under 35 U.S.C. § 103(a), those limitations that were not supported by the specification as indicated above will be examined in view of the limitations as

recited in originally filed claims 16 and 17. As detailed in the Office Action 09/15/2008, the

limitations as recited in claims 16 and 17 are unpatentable over Stephan and Snyder.

Claim Objections

Claim 25 is objected to because of the following informalities: Claim 25 recites "*The

method as recited in Claim 23*". Claim 23 is a system. Appropriate correction is required.

Specification

The specification is objected to as failing to provide proper antecedent basis for the

claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the

following is required: *inverted keyword red and black tree index* and *inverted keyword attribute red and black*

tree index in claims 11, 14, 18, 19 and 20.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of
matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the
conditions and requirements of this title.

Claims 1-3, 5, 7, 8, 11-14, 18-20 are rejected under 35 U.S.C. 101 because the

claimed invention is directed to non-statutory subject matter.

A patentable process must (1) be tied to a particular apparatus or machine or (2)

transform underlying subject matter (such as an article or materials) to a different state or thing.

See *In re Bilski, 545 F.3d 943, 88 USPQ2d 1385 (Fed. Cir. 2008)*. The method of claims 1-3, 5,

7, 8, 11-14, 18-20 is non-statutory in view of *In re Bilski*, e.g., the recited method is not tied to a

particular machine or apparatus, or it transforms a particular article into a different state or thing.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 11, 14, 18, 19 and 20 are rejected under 35 U.S.C. 112, first paragraph, as

failing to comply with the written description requirement. The claim(s) contains subject

matter which was not described in the specification in such a way as to reasonably

convey to one skilled in the relevant art that the inventor(s), at the time the application

was filed, had possession of the claimed invention.

Regarding claim 11, the specification does not have the description of newly added

inverted keyword red and black tree index and *an inverted keyword attribute red and black tree index* in the

claim. Neither the specification specifies how to generate *inverted keyword red and black tree index*

and *an inverted keyword attribute red and black tree index* nor the step of *inserting the keyword into the read*

and black index of the inverted keyword red and black tree index, converting the temporary keyword attribute

index into the inverted keyword attribute red and black tree index in the shared process memory buffer and

storing the inverted keyword read and black tree index and the inverted keyword attribute red and black tree

index in a shared process memory buffer.

Regarding claims 14, 18, 19 and 20, the specification does not have the description of

newly added *inverted keyword red and black tree index* and *an inverted keyword attribute red and black tree*

index and the features as recited in the amended claims 14, 18, 19 and 20. Therefore, these

claims are examined with the original filed features.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by
another filed in the United States before the invention by the applicant for patent or (2) a patent
granted on an application for patent by another filed in the United States before the invention by the
applicant for patent, except that an international application filed under the treaty defined in section
351(a) shall have the effects for purposes of this subsection of an application filed in the United States
only if the international application designated the United States and was published under Article 21(2)
of such treaty in the English language.

Claims 1-3, 5, 8-10, 23-27 and 30 are rejected under 35 U.S.C. 102(e) as being

anticipated by Stephan [USP 7,149,748 B1].

Regarding claims 1, 9, 10 and 23, Stephan teaches a method, program and system for

facilitating full text searching of a set of data, the method comprising:

obtaining keyword data corresponding to a set of data (Stephan, Col. 4-Lines 36-48, common

terms and no common terms as *keyword data* corresponding to a collection of documents as *a set*

of data is obtained);

generating an inverted keyword index and a separate inverted keyword attribute index corresponding to

the keyword data (Expanded inverted index is considered as being equivalent to *inverted keyword*

index (Stephan, Col. 5-Lines 35-58), inverted list is considered as being equivalent to *a separate*

inverted keyword attribute index (Stephan, Col. 4-Lines 49-55). The expanded inverted index and inverted list correspond to common terms and no common terms),

the inverted keyword attribute index including information from at least one category within a group consisting of language information, sentence information, ranking information, document timestamp information, and metadata information (The inverted list includes *metadata information*, e.g., document identifier, frequency of occurrences of terms... (Stephan, Col. 4-Lines 55-63));

storing the inverted keyword index and the inverted keyword attribute index in a shared process memory (Stephan, Col. 6-Lines 35-42);

obtaining a keyword query from a first process (Stephan, Col. 6-Lines 55-60); and

processing the keyword query using the inverted keyword index and the inverted keyword attribute index stored in the shared process memory (Stephan, Col. 7-Lines 1-39).

Regarding claims 2 and 24, Stephan teaches all of the claimed subject matter as discussed above with respect to claims 1 and 23, Stephan further discloses *the set of data corresponds to a set of documents* (Stephan, Col. 4-Lines 36-48).

Regarding claims 3 and 25, Stephan teaches all of the claimed subject matter as discussed above with respect to claims 1 and 23, Stephan further discloses *the set of data corresponds to a set of rows in a database* (Stephan, Col. 6-Lines 27-32).

Regarding claims 5 and 27, Stephan teaches all of the claimed subject matter as discussed above with respect to claims 1 and 26, Stephan further discloses *the inverted keyword attribute index corresponds to keyword occurrence information in the set of data* (Stephan, Col. 5- Line 64→Col. 6-Line 8).

Regarding claims 8 and 30, Stephan teaches all of the claimed subject matter as

discussed above with respect to claims 1 and 24, Stephan further discloses *storing the inverted*

keyword index includes dynamically adjusting memory pointers corresponding to the inverted keyword index

(Stephan, Col. 4-Line 63).

Regarding claim 26, Stephan teaches all of the claimed subject matter as discussed

above with respect to claim 23, Stephan further discloses *the shared memory buffer includes the*

inverted keyword attribute index corresponding to each node in the inverted keyword index (Stephan, Col. 4-

Line 34→Col. 5-Line 62 and Col. 6-Lines 35-42).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the

claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

claims was commonly owned at the time any inventions covered therein were made absent any

evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c)

and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

       Claims 7, 11-14, 18-21 and 29 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Stephan [USP 7,149,748 B1] in view of Snyder [USP 7,069,272 B2].

     .

       Regarding claims 7 and 29, Stephan teaches all of the claimed subject matter as

discussed above with respect to claims 1 and 26, but fails to teach *the inverted keyword index and*

the inverted keyword attribute index correspond to red and black index trees.

       Snyder teaches red and black index trees for a table to facilitate the search (Snyder,

FIG. 3).

       Therefore, it would have been obvious for one of ordinary skill in the art at the time the

invention was made to use red black trees as taught by Snyder for storing expanded inverted

index and inverted list to facilitate the search.

       Regarding claims 11 and 21, Stephan teaches a method, program and system for

facilitating full text searching of a set of data, the method comprising:

       obtaining keyword data corresponding to a set of data (Stephan, Col. 4-Lines 36-48, common

terms and no common terms as *keyword data* corresponding to a collection of documents as *a set*

of data is obtained);

       generating an inverted keyword index and a separate inverted keyword attribute index corresponding to

the keyword data (Expanded inverted index is considered as being equivalent to *inverted keyword*

index (Stephan, Col. 5-Lines 35-58), inverted list is considered as being equivalent to *a separate*

inverted keyword attribute index (Stephan, Col. 4-Lines 49-55). The expanded inverted index and

inverted list correspond to common terms and no common terms),

       wherein generating *inverted keyword index* and *separate inverted keyword attribute index*

comprising:

(a) obtaining the first keyword from the set of data (Index terms included in the vocabulary of terms of the collection of documents are obtained by expanded inverted index. The index terms include *the first keyword*, e.g., "Jack", in expanded inverted index (Stephan, Col. 5-Lines 30-58));

(b) inserting the keyword into the inverted keyword index("Jack" is inserted in expanded inverted index (Stephan, Col. 5-Lines 30-58));

(c) inserting keyword attribute data corresponding to the keyword into a temporary keyword attribute index(*keyword attribute data corresponding to the keyword*, e.g., {d, k, $f_{d,t}$ [C_1, O_1, …$C_{fd,t}$, $O_{fd,t}$]} (Stephan, Col. 4-Lines 52-62), is inserted into the inverted list);

(d) repeating (a)-(c) for all keyword data in the set of data (The process as disclosed by Stephan is repeated for each index term (Stephan, Col. 5-Lines 30-58)); and

(e) converting the temporary keyword attribute index into the inverted keyword attribute index in the shared process memory buffer (In light of the Specification, the claimed *temporary keyword attribute index* and *inverted keyword attribute index* are the same index. Therefore, this limitation is considered as being storing the *temporary keyword attribute index* in the shared memory buffer. As disclosed by Stephan, the inverted list is stored in cache, which is stored the expanded inverted index (Stephan, Col. 6-Lines 33-42)).

The missing of Stephan's teaching is the claimed limitation *the inverted keyword index and the inverted keyword attribute index correspond to red and black index trees*.

As further disclosed by Stephan, the index terms are included in the vocabulary of terms (Stephan, Col. 5-Line 30). The vocabulary of terms can be arranged in a B-tree (Stephan, Col. 1-Lines 27-29).

Snyder teaches red and black index trees for storing key value to facilitate the search (Snyder, FIG. 3).

Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to use red black trees as taught by Snyder for indexing key terms to facilitate the search.

Regarding claims 12, 13, 14 and 20, Stephan and Snyder, in combination, teach all of the claimed subject matter as discussed above with respect to claims 11, Stephan further discloses the features of claims 12, 13, 14 and 20 as discussed in claims 2, 3, 5 and 8.

Regarding claim 18, Stephan and Snyder, in combination, teach all of the claimed subject matter as discussed above with respect to claim 11, Stephan further discloses the steps of *obtaining a keyword query from a process*; and *processing the keyword query from the inverted keyword index in the shared memory buffer* (Stephan, Col. 6-Lines 55-60 and Col. 7-Lines 1-39).

Regarding claim 19, Stephan and Snyder, in combination, teach all of the claimed subject matter as discussed above with respect to claim 18 Stephan further discloses the steps of *obtaining a second key word query from a second process*; and *processing the keyword query using the inverted keyword index and the inverted keyword attribute index stored in the shared memory buffer* (Stephan, Col. 6-Lines 55-60 and Col. 7 Lines 1-39, this is an inherited feature when another query is processed).

Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stephan [USP 7,149,748 B1] in view of Aridor et al. [USP 7,043,472 B2].

Regarding claim 31, Stephan teaches all of the claimed subject matter as discussed above with respect to claim 23, Stephan further discloses *a disk subsystem for storing at least a portion of the inverted keyword index of a set of data* (Col. 6 Lines 33-42) but fails to teach and *a merge process for merging the inverted keyword index in the shared memory with the portion of the inverted keyword index in the disk subsystem*.

Aridor teaches *a merge process for merging the inverted keyword index in the shared memory with the portion of the inverted keyword index in the disk subsystem* (Aridor, Col. 9 Lines 28-30).

Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to have a merge process for merging the inverted index in order to have a integrated inverted index for a federated system.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HUNG Q. PHAM whose telephone number is 571-272-4040. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, JAMES K. TRUJILLO can be reached on 571-272-3677. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you

would like assistance from a USPTO Customer Service Representative or access to the

automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

                                                            HUNG Q. PHAM
                                                            Primary Examiner
/HUNG Q. PHAM/   Art Unit 2159
Primary Examiner, Art Unit 2159

May 21, 2009